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BULLETIN OF THE

NORTHERN ILLINOIS STATE NORMAL SCHOOL

DE KALB, ILLINOIS

A Course of Study in Nature Study

Part I.

Grades I, II, III and IV.

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COURSE OF STUDY IN NATURE STUDY

FRED L. CHARLES

PART I.—GRADES I, II, III, and IV.

NATURE–STUDY AXIOMS

The first consideration is the viewpoint of the child.

The true approach to nature cannot be made through a book.

The point of contact must lie in the life interests of the pupil.

The teacher should be none other than a lover of nature.

The field of nature-study is the whole physical environment of the child.

Concrete material—the real thing—is absolutely essential to the purposes of nature-study.

To yield *thinking* results, the work must be cast in the form of the problem.

Economic aspects demand increasing emphasis as we ascend the grades.

Nature-study can never come into her own where regarded as merely a handmaid to literature or to any other study.

The first movement of the child or of the race is to adapt to environment; the second is to control environment.

"The child is a research animal."

The commonplace is the most wonderful.

A fact without interpretation is barren.

"The pencil is the best of eyes."

First what, then how, then (if ever) why.

To know the seasons as they come and go is the mark of a naturalist.

The primary demand of all scientific pursuit is absolute integrity. It is easy to tell the truth, and nothing but the truth; to tell the whole truth is still beyond us. We must recognize our limitations. Absolute accuracy of statement is not too much to ask of any nature student.

"He is a good naturalist who knows his own parish thoroughly."

The soul of nature-study is the attitude it fosters or engenders.

FOREWORD

This bulletin appears in response to a suggestion made at the annual meeting of the Superintendents' and Principals' Association of Northern Illinois, held April 30—May 1, 1909. It is to be regarded simply as a contribution to the working material out of which a rational course of study will some day be constructed. No sane worker in nature-study is asking today for an immediate solution of his peculiar problems, or anticipating that final bases are yet established.

The materials here presented are the product of ten years of daily contact with and supervision of the nature-study classes in the eight grades of the N. I. S. N. S. Training School. Weekly teachers' meetings in which subject matter, method and values are discussed and specific directions given; constant visitations and criticism; occasional critique lessons; frequent personal charge of different classes for a series of lessons or sometimes for an entire term,—these and other features have afforded unusual laboratory facilities for testing materials and methods. Whatever of value there may be in the following pages lies in this fact. At the same time, the slow progress made will serve to emphasize how great is the field and how serious the need of a concerted attack.

For a number of years the Northern Illinois State Normal School has published annually a catalogue bulletin in which is included the course of study of the Training School. The introduction to the nineteen pages devoted to Nature Study, suggesting very concisely the general organization of the course, reads as follows in the last edition of the bulletin:

NATURE-STUDY

This work is under the general direction of the head of the Science Department. Outlines are prepared amplifying the course of study and forecasting the studies of each month; each topic is elaborated and discussed with the student teachers in regular teachers' meetings. The daily work is under the constant observation of the critic teachers and in immediate touch with the science laboratories.

In the lower grades, the studies are of an informal nature, aiming to acquaint the pupil with the more familiar features of his environment and to foster in him a sympathetic interest and a spirit of inquiry. In the intermediate classes there is an increasing emphasis upon the interpretative, experimental and economic aspects of the study. There is also an increasing opportunity to elucidate and enrich the other lines of study, and to exhibit the practical bearing of scientific knowledge on the conditions of living and on commercial and industrial processes. The course calls for much experimentation; such investigations must be developed inductively and must be the pupil's means of solving problems which have arisen in the classroom. In the grammar grades there is occasion to organize and systematize the studies so that they take on in considerable measure the aspect of elementary science.

In each grade some form of individual nature-study notebook is kept, serving as a record of the work done; nature notes and calendars are preserved from year to year. While the topics chosen are determined largely by the changing panorama of the seasons, there is nevertheless considerable correlation with other studies. In all grades, in the winter term, ten weeks are devoted to the study of Human Anatomy, Physiology and Hygiene, including instruction as to the effects of alcohol, tobacco and narcotic poisons, as demanded by the Illinois law. In the spring term, especially, the school garden receives appropriate attention. In each room, collections are made of nature-study material, to remain as the permanent property of the school.

In the course which follows, more material is suggested than can be treated in the time allotted; there is opportunity, and even necessity, for choice. But throughout this work the purpose is not to cover ground, but to develop appreciation and power. The soul of nature study is the attitude it engenders.

(References marked (N) are printed leaflets issued by the Science Department under the title of "Northern Illinois Nature Studies." They are distributed to the students in the department and to student teachers in charge of nature-study classes).

Nature-study, as we shall use the term, is of wide scope, embracing all that may properly be done in the grades in the study of plants, animals, human body and health, weather, minerals and soils, physical and chemical phenomena, agriculture and other phases of applied science, thus rubbing elbows closely with geography and the manual arts.

There seems to be always a strong temptation to enter upon an excursive discussion of nature-study. However, as the insistent demand today from the public schools is for specific and concrete direction rather than inspiration or theorizing, the following pages will be given over to a practical course in which will be incorporated only a very condensed statement of certain underlying principles. It will be immediately evident that the successful application of this course by the present generation of teachers calls for the prompt appearance of even more detailed studies, of the nature of teaching monographs, organizing these materials into type studies for the purposes of the elementary school. Since the mode of approach, or the point of contact, is of great significance in the introduction of any study, special effort has been made here to make helpful suggestions for meeting the child mind.

The topics in this course are arranged in a desirable but by no means invariable order suggested largely by seasonal conditions. There are first given (for each term) a number of topics which are believed to be suitable for almost every locality in northern Illinois. Being appropriate to the grade—as judged by experience—and chosen with care as to present and future values, they may be regarded as required topics. If nature-study is to have the permanent place which it so richly merits in the curriculum, the random hit-or-miss efforts so prevalent today must give way to a rationally organized sequence of topics such as has been attempted here, or to something of a similar character. Following the assigned, or "required", topics are given in some instances a number of optional studies from which, if desired, selections may be made on the basis of interest or availability of material. No attempt has been made to cover the entire field. Primitive races and home geography, for example, are almost wholly neglected.

The grades are arranged in three groups,—Grades I, II and III, generally known as the primary; Grades IV, V and VI, known as intermediate; and Grades VII and VIII, usually characterized as the grammar grades. A brief statement of principles will be given for each group and for each grade.

FIRST GROUP—GRADES I, II AND III.

When six-year-olds present themselves at school we should take them as we find them. In large measure free and natural, a part of nature, they have been playmates to the birds and flowers and trees, riding broom-stick horses and baking pies of mud. This nature contact should not be taken from them, for both body and spirit crave the out-of-doors.

FIRST GRADE

The nature studies of the First Grade, then, will be largely informal, dealing generally with familiar material, fostering native interest, widening acquaintanceship with natural forms, disciplining powers of observation and description. There will be many trips afield—if only to the dooryard—sometimes on a care-free voyage of discovery, but generally to obtain desired material or to satisfy some other definite, predetermined end. Aesthetic values will be prominent but affectation and sentimentality are to be deplored. Moral possibilities cannot be overestimated; a premium put upon reports of unusual observations may result in competitive lying, while tactful encouragement of accurate seeing and telling may lay deep foundations for a love of truth.

FALL TERM

Report and Discuss Summer Experiences and Out-of-door Activities

Did you have a good time during the summer? What did you do? Did you go away from home? Fourth of July, picnics, visits to relatives, travels, camping, work in garden, farm life, picking berries, riding, indoor work.

Select some activity, such as the picnic, for further discussion. Where did you go? Why did you choose that place? Tell what kind of a place it is,—trees, grass, river, birds, squirrels, sunshine, fresh air. Games, play, dinner, etc.

Identify the most Common Plants which are now in Flower

Go out-of-doors to enjoy the landscape and to learn to recognize and name the familiar flowers of autumn,—sunflower, goldenrod, aster, thistle, evening primrose, wild mustard, dandelion, vervain, yarrow, smartweed, and others. Take the most common and abundant first; too long a list will confuse. Pick one specimen of each kind to take indoor, unless material is profuse, when a bouquet may be desirable. Determine which plants are to be regarded as weeds, if conditions warrant. What is a weed?

Make a chart of the wild flowers for each autumn month. Press (or otherwise dry) the specimens and fasten by pasting or sewing to a large sheet of cardboard. Notice obvious resemblances, as in color, arrangement of flowers on the stem, shape of the flower, etc.

Blanchan—Nature's Garden; Mathews—Fieldbook of American Wild Flowers.

Make a Weather Chart for each Month

On a large sheet of cardboard rule a blank calendar form for the month, ornamenting the chart with appropriate drawing or seasonable nature material suggested or determined by the class. Keep daily record of the weather, limiting the observations to the "kind of day",—clear, cloudy, rainy or snowy. Indicate weather by colored circles which are to be pasted in the space for the day; use yellow for sunny, gray for cloudy, blue or dotted gray for rainy, and "diamond dust" for snowy. The diamond dust may be obtained very cheaply from druggists, and is applied with mucilage. Instead of the circle for the day, in November use the outline of a pumpkin, in February a hatchet, etc., if desired.

Seed Dispersal in Thistle and Milkweed

Notice seeds of thistle, milkweed and dandelion as they are floating in the wind, and capture some. What are they? What makes them go? Remove the parachute (sail) and see if the seed alone will float. How rapidly are they traveling? Where did they come from? How far do they sail? Is it a good thing for them that they leave the parent plant in this way? Do they start out in all sorts of weather? Find a plant with mature seeds ready for distribution; wet the seeds to see the effect of rain upon them. Blow the seeds from a "head" and see how they are scattered. Why do we find these plants so common everywhere?

Look for other seeds which are distributed by the wind; make a chart of them, mounting the specimens. Notice how the flower changes with age; collect specimens showing the stages from bud to ripened fruit or seed.

If occasion invites, notice other modes of dispersal—or rather notice seeds which are employing other means of dispersal—but place the emphasis this year on the seeds which sail.

Beal—Seed Dispersal; Weed—Seed Travelers; Bailey—Lessons With Plants; Scott—Nature Study and the Child.

Hibernating Insects

About the flowers, on the ground, in the garden, on the trees, under stones, we find interesting insects. Identify some of the more common, —cricket, locust, grasshopper, ground beetle, bumble bee, honey bee, dragonfly, ant, house fly (which we are going to rename because of its bad character as a spreader of disease; call it the typhoid fly), blow fly, mosquito, milkweed (or monarch) butterfly, cabbage butterfly, and others. Where does each kind live? What are some of its habits? How are they going to spend the winter?

Notice the different kinds of caterpillars, see what they are eating, and bring some into the schoolroom, providing dirt and food. Make them feel at home: see whether they make any provision for winter. Find cocoons and chrysalids on trees, under leaves, under bark, under boards, on old buildings, etc., and bring them in to store over winter. Look especially for caterpillar or chrysalis of milkweed butterfly and cocoon of cecropia moth.

Familiar Trees

Excursion to identify a few familiar trees as their leaves begin to color. Note characteristic color of different species,—scarlet oak, wild black cherry, hard maple, soft maple, elm, linden, willow. What is your favorite tree? Obtain typical leaves, press them and paste or sew upon a large sheet of cardboard to make a "leaf chart".

What was the first tree to color? Which was the brightest? Which was bare first? Which are still green? Do any stay green all winter? What do we call them?

What will become of the fallen leaves? Excursion to the woods to observe fallen leaves and leaf mold ("rich" dirt). Teach that dead leaves are valuable. Make compost of alternate layers of soil and leaves; use this next year for potting plants.

Keeler—Our Native Trees; (N) The Oaks.

Identify a few Common Birds

Learn to name those birds which are most commonly seen about school or home. Study the bird rather than books or pictures. Note activities, habits, calls, the most prominent features. If possible, observe flocking of robin, bluebird, bluejay, crow blackbird (bronzed grackle). Were the birds living in flocks throughout the summer? What were the robins doing during summer? (Keeping house; caring for the young). What will the birds do when winter comes?

Later, discover snowbird, chickadee and kinglets if these northern birds are abundant. See topic "Anticipations of Spring," under winter term.

Plant Bulbs of Chinese Lily or Paper White Narcissus in Water

These bulbs are said to grow and produce flowers very quickly; people plant them to beautify their homes; let us try it. Place some pebbles in a bowl of water and on these place the bulb; then add more pebbles to hold the bulb in position. In a large bowl use three bulbs. Have the water cover the bulb entirely, or nearly so, and add water whenever necessary. Place the bowl near the window. Follow the development of the plant. Encourage similar planting at home.

(N) The Planting and Care of Fall Bulbs.

Garden and Farm Activities

Visit the school garden or some available private garden or farm near the school. What are gardeners and farmers busied with now? What plants are still growing? What are the first to be killed by the frost?

Which are not damaged by the frost? What part of the beet plant do we save? What part of the cabbage plant? Of the pumpkin? Of the corn? Of the nasturtium? Of the sunflower?

Gather seeds of nasturtium, sunflower, gourds and popcorn for planting next spring. Careful choosing, labelling and preserving of seeds.

Identify common vegetables and fruits of autumn. Emphasize the corn harvest—in field and crib, gathering and storing.

The Apple

In connection with Thanksgiving identify a few kind of apples. The snow apple, the russet, the greening, the jonathan and the king will be readily characterized. Which do you like best? How does it taste? Which kinds keep well? Which cost the most? Which make the best pies? Which are best for baking?

What parts of the apple do you throw away? Why? What are the seeds for? Of what use to the apple is the core? the skin? How many parts in the core? Is the number the same in all apples? Of what use to the apple is the pulp, the part which you eat? If there were no people to eat the apples; what would happen to them? Do you know any animals that like apples? What advantage to the thistle or dandelion that the seeds traveled so far from the mother plant? How is it with the apple? Do you like unripe apples? How do the seeds taste? How do they feel? What is their color? How do the seeds look in an unripe apple? What might happen to the unripe apple if it were soft and sweet and red? What would be the result if all the apples were picked or destroyed before they were ripe? Save some apple seeds to plant on Autumn Arbor Day.

Did you ever find a worm in an apple? How did the worm get into the apple? Did you ever find an apple with a bad, or decayed, spot in it? What happens if you leave a decaying apple in a barrel or dish with others? What should you do with a barrel of apples to make sure that they will keep as long as possible?

How did the apple start to grow on the tree? What was there before the apple appeared? Let us watch the apple trees next spring.

The First Snowfall

This may be made quite an event. Record the date. If possible, take class to catch large feathery crystals as they fall upon something cold and dark, perhaps a child's coat; note their beauty. Watch one as it comes down. How light it is! How many patterns do you find? How many points or corners does each flake have? Can you draw the picture of one? Where does the snow come from? Of what is it made? How do you know?

What other form of water shows beautiful crystals? Where do you find frost? When is it formed? Where does the frost water come from?

Similarly, hail and dew, if within the experience of the children.

Autumn Arbor Day

Celebrate this day. Note date (designated by the Governor) in Arbor and Bird Day Bulletin issued last spring by the State Superintendent. Let first grade plant seeds of apples which they have been studying. What other fruit tree seeds might we plant now? (Peach stones.) Why not wait until next spring to plant them? Jack Frost will crack them open for us—and where could you get peach stones (or apple seeds?) next spring?

The Cat.

Puss enjoys the fire these cold days. Where does she sleep? How long does she sleep? Do you think she is lazy? How does she lie when taking a nap? Does she play? How? Does she talk to you? What does she eat? How does she drink? Does she ever find her own food? Did you ever see her go hunting? How does she act?

Note—(having pet cat in school room)—her eyes, nose, ears, whiskers, paws, claws, and discuss adaptations. How does she carry her tail when she is after a mouse? How does puss get meat from bones? Look at teeth; feel of her tongue, or let her lick your hand. Feed her; give her something to drink.

Is she protected from the cold? How? In addition to the furry coat there is a blanket of warm air in her fur—air warmed by her body and kept in place by the fur.

What enemies has the cat? How does she defend herself? What good does puss do? Does she do anything harmful? Did you ever know of a cat catching birds? During the spring many young helpless birds are caught and eaten by cats. We should at such time keep the cat indoors or tie a bell around her neck.

Once upon a time cats were wild: man has tamed them; how must they have lived when wild? Do you discover any of the wild traits still persisting? Why, do you suppose, were cats tamed?

How graceful; what a good climber and runner; how cleanly. Tell how your cat washes herself or her kittens. What have you seen kittens do?

Fine sense of hearing; awakened by sound as of mouse scratching; movable ears—how does the movement of the ears aid in hearing? Large eyes; dilating pupils; put the cat in dark closet for a while and note change in pupils, which contract when brought to bright light. In dark places cats can see no more than men—a chance here to dispel a popular illusion. The cat is guided in the dark by fine sense of touch; see how sensitive when one hair (whisker) is touched; the hair over the eyes, and all over the body, is also sensitive, for puss objects to being stroked the wrong way—her coat is sensitive. Sense of smell dull compared to other senses.

Discuss cat's mental qualities—courage when attacked; patience when after prey; cunning; etc. Relatives of cats;—wild cat, lynx, lion, tiger. Celebrated pictures of cats.

Schmeil—Introduction to Zoology; Hodge—Nature Study and Life; Scott—Nature Study and the Child; McMurry—Nature Study for Primary Grades.

The Christmas Tree

Do you know where Christmas trees grow? Most of ours come from the north country; young trees are cut down and brought to Chicago in ships. What is the name of the Christmas tree? Three kinds—pine spruce, balsam fir. Excursion to identify each; twigs of each in class. Which kind makes the best Christmas tree? The balsam; why? What objection to the pine? To the spruce? Do you know what use is made of the balsam needles? (To most people every coniferous tree is "a pine tree".)

Shape of the tree; study of branches and stem (trunk); angle of branches, arrangement, length, etc.; advantages of this scheme; relation to light. Arrangement of leaves; advantages; do the leaves fall? When? Mark some leaves on a growing tree and see how long before they fall; tie a string about the twig to identify it. Appearance of new leaves in spring; watch and learn. Provision in leaf for winter; water-proof coat—oil, gum, etc.

Identify arbor vitae; its uses. Cedar poles.

Cones; identification of different kinds: their function.

Decoration of the tree; danger from candles.

Hans Andersen's story of The Fir Tree.

(N)—The Christmas tree; (N)—Light Relation in the Pine Tree.

WINTER TERM

Weather Chart For Each Month

See directions for fall term.

Clothing

We have talked of how the cat keeps warm in winter; how do we keep warm? Fire; clothing; house; warm food. How does winter clothing differ from that worn in summer? How do these changes keep you warmer? (Retention of body heat.) Sources of clothing; kinds of cloth worn in winter. Special precautions against loss of heat; ways of producing more heat—exercise, deep breathing, food. Tight clothes; changing and airing clothing. Other purposes of clothing—protection from injury; gloves, shoes, etc.

Summer clothing; purpose of fanning ourselves; how fanning cools us. Danger during changeable weather; precautions.

(N)—Hygiene for Primary Grades.

Food, Eating and Drinking

The body an engine; how we warm the house in winter: the stove or furnace; how an engine differs from a stove: how the body is like a stove, or, better, like an engine. Fuel—food. Growth: importance of care and proper habits. Repair; purposes of food; production of waste; bathing; exhaled air.

Wholesome food; kinds of food; how to eat; importance of thorough mastication; value of good cheer at meal time; good manners in eating. When to eat; eating between meals. Care of teeth. Cooking; different methods; values. Drink. Temperance in eating and drinking.

(N)—Hygiene for Primary Grades.

Care of House Plants

Plant necessities—water; light; temperature; soil; air. Identification of a few common house plants—geranium, fern, begonia, umbrella plant, colias (foliage plant), etc.

Plant nasturtium in window boxes.

The bulb plants planted last fall have been of increasing interest and are now in flower; see that they are properly cared for. Record dates of various stages—planting, sprouting, appearance of buds, flowering, duration of flowering. Simple sketches and measurements if desired.

(N)—Window Gardens; (N)—Planting and Care of Fall Bulbs.

Breathing and Ventilation

Air a necessity; compare fanning a bonfire, blowing upon kindling to encourage flame, draft in stove, etc.; more rapid breathing during exercise—when more heat is produced.

How to breathe; contrast nose and mouth. The lungs; locate; inflate; advantages of deep breathing. Good posture.

Pure air; advantages of living in the open; value of sunshine. Exhaled air; excretion by lungs. Ventilation of dwellings—especially of sleeping rooms; ventilation of public buildings; ventilating systems; how to ventilate by windows. Airing of bedding. Tuberculosis.

(N)—Hygiene for Primary Grades.

Special Senses

Means of learning, enjoying, directing movements, avoiding danger; five helpers—eye, ear, nose, tongue, hand.

Exercise of each; recognition of objects or substances by use of different sense organs.

Care of each organ.

(N)—Hygiene for Primary Grades.

Emergencies

Accidents frequently occur; we should be prepared to help ourselves or others. What accidents have you experienced? What to do in case of cuts, scratches, burns, nose bleed, frost bites. Demonstration.

(N)—Hygiene for Primary Grades; Red Cross Handbook; Gulick—Hygiene Series, Book Two—Emergencies.

The Horse

How many of you have a pet horse at home? Have any of you a pony of your own? What is its name? Is it afraid of you? How tame is it? Are you on the best of terms with one another? How old is it? What does it do for you?

How faithful horses are; how hard they work; how well we should treat them. Horses are naturally timid; how can we overcome this timidity? How do you feel when frightened, if your father is near? The horse can learn to have confidence in his master, if his master is kind and thoughtful in his treatment of the horse. How are horses trained to work? Did you ever see a little colt? How old should a colt be before it is made to do hard work? How do men teach young horses? How do they "break" a colt? They must be kind, but firm; train to obey signs. What signs are used in driving? Use of harness; parts of harness—bit, bridle, reins, or lines; use of blinders; cruelty of the check rein; cruelty of docking the tail.

Where do you keep your horse? How often is it fed? What does it eat? Did you ever watch a horse eating grass? How does it get the grass?

What are horses used for? Pleasure driving; hauling heavy loads; horseback riding. Is the same horse used for all these purposes, or are there different kinds of horses? Notice the horses which are kept for very heavy work; how strong they are; heavily built; powerful legs; large body. The carriage horses; how do they differ from the draft horses? More slender; lighter; greater speed and less strength required. Saddle horses; trotting, pacing, galloping, or running. Identify each kind of step if possible. Pictures of different types of horses.

Care of the feet; hoofs—adapted for solid dry ground; contrast with foot of pig; compare with finger or toe nail. The horse shoe; visit blacksmith shop; different types of shoes for different purposes.

How did wild horses live, before man caught and tamed them? What enemies did they have? Why did they have to run so fast? The long, slender legs, slender body and head enabled the wild horse to speed away from the wolves. How could the wild horse detect its enemies from a distance? Hearing very keen; position, shape and movement of ears. Sight keen. If its enemies came upon it, how could the horse fight? Kick with its powerful legs and hard hoofs; bite with its teeth. Horses today retain the timidity, the fighting power and other traits of their wild state.

How is the horse kept warm in winter? It should be protected from the cold, especially after hard exercise, by a blanket. Does the horse have any protection of its own against the cold? Heavier coat of hair or fur in winter; when does the horse "molt" or shed its winter coat?

During the summer how may we add to the comfort of the horse? Protect it from the flies. Flies breed in horse manure; their eggs are laid in manure. It is better not to let the flies hatch. Find out how to keep the flies from hatching in the manure. Flies carry diseases and are very bad about the house; people do not always realize this.

Shaler—Domesticated Animals; Schmeil—Introduction to Zoology (excellent for popular study of any animal); Davenport—Leaflets published C. M. Parker, Taylorville, Ill.; McMurry—Nature Study for Primary Grades.

Anticipations of Spring—Spring Changes

How much longer may we expect snow? Why do we not have snow all the year? What happens to the snow that falls on the ground? What do we call the cold time of year? What season follows winter? When does spring begin? Have you already seen any signs of spring? Tell what changes you have noticed.

What kinds of birds do you know? What is your favorite bird? Is it here now? What kinds of birds have you seen lately? Tell what they were doing. Are the robins here now? Where have they been during the winter? Why did they leave this place and go toward the sun? If it was too cold for the robin and blackbird, how could the little chickadee, the junco (snowbird) and English sparrow stay here? Probably it is not the cold so much as something else—scarcity of food. What do robins eat? What does the snowbird eat? Birds usually go where there is an abundance of food. Where do you see the snowbirds? (Along roadsides and fences, or in weed patches; see if you can find weed seeds in the stalks which stand up through the snow. Excursion?)

Calendar of returning birds—limited to a very few; only the most common and easily identified. Distinguish between summer residents (robin) and winter residents (snowbird). Learn to know a very few birds well; study the habits of those kinds which you see most frequently. Picture the daily life of a robin which arrives in the north and experiences adverse wintry conditions. Avoid sentimentality. Do not approach birds through books or pictures; deal with the real thing and stay within the child's own powers of observation. Robin, English sparrow, bluejay, meadowlark, crow, bronzed grackle (crow blackbird), junco (snowbird), flocks of ducks and geese flying overhead, and possibly a hawk, owl or woodpecker—the list can not be much longer than this. Know one or a few intimately, noting especially the characteristic behavior or activities.

Have you noticed any changes in the trees? Do you know the pussy willow? (Excursion) How rapidly does the pussy grow? Where was it during the winter? (Simple examination of the winter bud. Do not call the bud scales blankets; to think that the buds are kept warm is a mistake; they function chiefly as protection from moisture—dangers of freezing and thawing if wet.) What is the pussy? What is to become of it? Watch it as it develops.

What other kinds of trees do you know? Have you detected spring changes? Where is there an elm tree? Where a soft maple? Watch them. Report when their buds have opened.

Other awakening plants—dandelion, chickweed, etc.

Caterpillars appear; where have they been during the winter? Earthworms; snakes; "gophers".

When will it be time to prepare the garden? Can we do anything earlier indoors? Shall we plant seeds in a window box? It is time to be planning these things. Plant nasturtiums in window box, if this has not already been done.

Spring games; what do you play out-of-doors these warm spring-like days? What do the older boys and girls play?

A pleasant vacation to you.

OPTIONAL STUDIES

The Mouse

Studied while kept in captivity in suitable cage made by or under direction of class. Habits; mode of life; adaptations.

McMurry—Nature Study for Primary Grades; Schmeil—Introduction to Zoology.

SPRING TERM

Twigs of Elm, Soft Maple and Willow

Opening of flower bud and twig bud; distinguish these two kinds of buds before and after they open; watch their development. When they begin to open on the trees—not before—bring in some twigs (obtained by class excursion) and keep them in fresh water for closer observation. (See discussion of pussy willow under last topic in winter term.)

Possibly roots will appear on the willow twigs after they have been in water for a while. Could we make new trees in this way? Try it with elm, maple and willow. How else might we try it? Experiment in propagation from cuttings in water, dirt and sand. The willow seems to do better than the others; it commonly grows wild about water. If roots develop, plant the cuttings where they will thrive.

Buds of hickory, horse chestnut or lilac are large and may be used to supplement the study of the commoner trees.

Newell—Outlines for Lessons in Botany: Scott—Nature Study and the Child; Bailey—Lessons with Plants.

The Apple Twig

Follow bud, blossom and developing fruit; life history of an apple. Make occasional visits to trees to note progress. Parts of flower; modification to form fruit.

Substitute cherry for apple if it is more available; or peach or plum.

Bailey—Lessons with Plants; Bailey—Botany.

Early Growth of Herbs

What kinds of weeds do you know? What plants are green now? Identify dandelion, thistle, burdock, chickweed, shepherds purse. Make special study of underground parts. How does this dandelion—or burdock—manage to get so early a start? Did it live over winter? What part was alive? How long does the plant live? Here is a tiny plant; could it have lived over winter? When did it begin to grow? From what? (From seed this spring.) When did these older plants with the large roots begin to grow?

Some kinds of plants live only one year, some two years, and some for many years.

Acquaintance with a few most Familiar Birds

See suggestions for fall and winter terms; select for study the most abundant species—those commonly seen. Careful identification and observation of habits. Make greater point of characteristic haunt, movements, song and food habits than of details of size and color. Colored plates or mounted specimens may be used for verification in class room after field study.

Take classes out-of-doors frequently during pleasant spring days when birds are abundant. Do not scatter interest and attention by attempting too many species. Dates of interesting observations, as first arrival, nest, or young. Select birds with striking characteristics.

The flicker—what is it doing? How does it hang to the tree trunk? Notice feet (if visible) and tail. What is it trying to do? (Find food in wood or under bark—or make hole for nest.) Notice its position against the tree and we will make a picture of it when we return to school. Notice the flicker as it flies; what bright colors do you see? Yellow under wings; white on rump, or base of tail. What is its call? ("Ker-flick! ker-flick!") How does it get its name? Did you ever hear it called by any other name? It is also called highholder, or high-ho, yellow-hammer, and goldenwinged woodpecker. Do you see the meaning of each name? How does the flicker fly? He bounds through the air; flaps his wings and then bounds with the wings closed against his sides. How does a crow fly? How does the meadow lark fly? We often see the flicker on the ground. What is it doing there? When it flies away we will go over and see whether we can find out what it wanted on the ground. Perhaps it was eating ants; flickers are very fond of ants and eat large numbers of them at one meal. Do you see other kinds of woodpeckers on the ground? Can you distinguish the mother flicker from her mate? If you are cautious and do not frighten the birds you may get close enough to see that the father bird has a black cheek, while the mother bird has no mark on her gray-brown cheek, or rather on the side of the throat. What other bright markings do you notice? Are they the same on both birds?

Study a few other familiar birds in somewhat the same fashion. Get at the real life of the bird.

Arbor and Bird Day

Our indebtedness to trees and to birds; how different it would be without them; how barren some places are; what we can do to attract the birds and to increase the number of trees.

Plant seeds of elm and maple which we have been studying—or arrange to plant them later if they are not now mature. Plant cuttings of willow which have been growing in water, sand or dirt. If possible to obtain a tree, plant an apple tree—we have been studying the apple, or plant peach, cherry or plum if they have been used in place of the apple —or plant a "Christmas tree", an evergreen of some kind, preferably a spruce or balsam.

Have a place in your yard where you throw crumbs or other food for birds; hang out threads, string or yarn for use as nesting material; put a basin of water on a post where the cat will not annoy the birds which come to bathe or drink there; tie a bell on the cat during these days when song birds. Is there anything you could put in the basin with the water which would assist the robin? What does the robin use in building its nest? If the robin wishes to build in your yard, where will it have to go for mud if the weather is dry?

Songs and recitations about trees and birds—but best of all, *doing* things.

Illinois State Arbor and Bird Day Bulletin, published by the State Superintendent at Springfield; also the Wisconsin State Bulletin.

The Squirrel

In many localities, country, town and city, the squirrel is a familiar animal. Possibly a pet squirrel is available for study in the school room, The work suggested for the cat, horse and mouse will indicate method. If convenient, an excursion to a park where squirrels are abundant, or to a home where a pet squirrel is comfortably housed and cared for.

Schmeil—Introduction to Zoology; McMurry—Nature Study Lessons for Primary Grades.

Spring Flowers

Identification of a few common spring flowers: wild flower chart, with dates. If buttercup, violet, wild geranium and others are abundant in the neighborhood, or available without danger of extermination, transplant specimens to a wild flower garden.

Identify flower parts—already learned, perhaps, in the study of the apple bud and blossom—and discuss their function. Pollination by insects, especially by bees and butterflies, which may be discovered about the apple, willow or wild flowers.

McMurry—Nature Study for Primary Grades; Newell—Lessons in Botany; Blanchan—Nature's Garden; Bailey—Lessons With Plants.

The Garden

If there is a school garden the first grade may as a group plant two beds, one of flowers and one of vegetables. Each child should have a share in the planting operations. Give the garden proper care through the season. If there is no garden at school, visit some good home garden occasionally and follow its development.

In one bed plant sunflowers; in the other, popcorn. Develop an interest in these plants; let the children tend them. The popcorn may be used next Christmas at school. The sunflowers will be ornamental out-of-doors and within, and the birds will enjoy the seeds.

Nasturtiums may be planted out-of-doors by this grade; they were planted last term in window boxes. The wild flower garden should be against the building or along the fence.

To emphasize modes of propagation other than by seed, plant gladiolus or tiger lily.

OPTIONAL STUDIES

The Frog and Its Development

If frog spawn is available a most interesting study may be made of the life history from egg and tadpole to adult frog. The eggs must be placed in fresh water; they will quickly die if the water becomes foul. Give plenty of water, with large surface exposed to air. After hatching, the tadpoles should have a supply of plant food—preferably pond scum, or algae, common in ponds and streams. As they grow older the diet changes and they should be fed meat or insects. When gills give way to lungs there should be some provision for the young frogs to rest above the water. The study may be quite informal; the children will be interested in the metamorphosis; see that they get the significant points. Let the children assume the care of the aquarium.

Hodge—Nature Study and Life; Morgan—Development of the Frog's Egg; Holmes—The Frog

The Caged Canary

If these birds are commonly kept in the neighborhood, obtain one for a day or two at the school. Study its habits, the character of its food and drink, how it cracks the seeds, the fitness of its bill for this work, the perching foot, the necessity of cleanliness, the song. If possible, the building of the nest. Best of all, a pet bird which is at home and fearless outside of the cage.

What other birds are of similar structure and habits—seed eating? The canary is a yellow sparrow.

Life History of Butterfly or Moth

If the large cocoons of the cecropia moth were available last fall, they should be in a place where they may be under constant observation during the spring until the moth emerges. If other cocoons or caterpillars were in hibernation in the school room (see directions for fall term) they may afford interesting studies during the spring.

SECOND GRADE

No sharp demarcation is to be noted here. The pupils have a somewhat broader outlook to nature; they have strengthened their powers of attention; they are ready to look at somewhat larger wholes and somewhat smaller parts; they can better observe, describe and (to a very limited degree) analyze; they have greater manual skill and hence can better manipulate materials. However, in the main, interests, aims and values are the same as in the preceding year.

There cannot be serious objection to the consideration in this year of certain general topics which have received some attention in the first grade. There was so little of intensive study in the first year, the material was treated so informally and was of such intrinsic interest, that a reconsideration in the second grade is not only permissible but in many cases desirable, although this would be dangerous practice with more mature pupils. It is well to use new material, however, in illustrating a principle already established; thus, in the first year, seed dispersal was noted in the milkweed, thistle and dandelion, while in the second grade the burs are studied.

FALL TERM

Report of Summer Activities and Observations

See outline for fall term of first grade. After a general canvas and report of summer experiences, select farm life for more detailed discussion.

The Garden

Recall the planting last spring of popcorn, nasturtium and sunflowers,—perhaps other vegetables and flowers. Discover how these have prospered through the summer and give them such attention as they may need. Make very simple comparative study of garden flowers; indentification, color, form, names and function of parts; single and double flowers; how different from (related) wild flowers. Find trail of leaf miner in nasturtium leaf. Visit home gardens.

Recall last year's chart of autumn wild flowers and weeds. Renew acquaintance with them. This fall make chart of cultivated flowers. Make special study of pumpkin flower.

Later, gather and store popcorn for winter use. When shall we pick the popcorn from the stalk? How shall we care for it until we want to use it? How many ears on a stalk? How much would we have to pay for our harvest if we had purchased it from a gardener or farmer or groceryman?

What do we call the top part of the plant? (Tassel.) What is its use in the life of the plant? Are the dead stalks of any use to us? What do farmers do with the stalks? How many kinds of corn do you know? Can you name three? (Popcorn, sweet corn and field corn.)

How has the sunflower plant changed since we left it in the spring? Why do we call it "Sunflower"? What do we call each "flower"? (Head.) How many heads are there on one large plant? What visitors does the sunflower entertain? Watch for them. (Bees: wild canaries; and other seed-eating birds.)

Draw a picture of a sunflower head. How shall we name the parts? What comes from the sun? (Rays.) What are the rays in the flower? (The yellow "petals".) The central dark part we will call the disk; look at it carefully. What do you find? (Seeds.) What was here before the seeds developed? Where can we find the answer to this question? Let us look at a young head. What do you find in the center? (A disk of little flowers,—florets.) Pick out one floret; describe it. The disk, then, is made of florets, each of which later produces one seed. Around the disk flowers are the ray flowers (florets) which are much more showy. What, then, is the sunflower head? (A large number of florets of two kinds.)

Let us look for other flowers which are really "heads" instead of single flowers. What do you find? (Other composites,—daisy, aster; in many, the florets are all of one kind. Look at the dandelion blossom; what do you find?) Find different kinds of asters.

Scott—Nature Study and the Child; Lange—Handbook of Nature Study; Wilson—Nature Study in Elementary Schools.

The Cricket

After the excursions we have taken to see things, let us go out now to hear things. Birds, gophers, crickets, locusts, grasshoppers, cicadas, bees. Use of the term insect. Recall last year's study of insects,—especially caterpillars, butterflies and moths.

Let us get better acquainted with the crickets. How do they make their chirp? What do they eat? Where do they stay over winter? Could we arrange to keep some in the schoolroom? What kind of a home shall we prepare for them? How shall we furnish it? Box (of wood or cardboard) with glass top and wire screen sides—or something simpler; a layer of dirt; grasses.

Excursion to capture crickets to stock the vivarium. Where do we find them most abundant? What are the advantages of such a place as a home for crickets? Are all the crickets alike? What differences? Some are small; some have no wings; some have a long needle-like projection from the body. How do you account for these differences? (It is not necessary to discuss—nor, indeed, to discover—all these points during the excursion. There is enough here for a number of informal lessons.) We must provide food, hiding place, fresh air, etc., for our crickets. Develop the meaning of the ovipositor in the mother cricket; of the absence of wings in the young; look for a series of successive ages, or stages, in growth. How do crickets travel?

Do all the crickets sing? When one chirps, approach cautiously and discover how the chirp is made. Only the father cricket chirps. See how he uses his wings to make the chirp; he is a fiddler. Do crickets sing at all times of day? At night? At all times of year? What other insects are most like crickets? Locusts, grasshoppers, katydids. Listen for them.

(N) The Locust and Its Relatives

Bird Studies

Follow suggestions given for each term of first grade. Deal with real live birds, studying the habits of those which are abundant in the neighborhood.

Trees

Renew acquaintance with familiar trees as they assume autumn colors. See suggestions for first grade, fall term. Identify all the common nut trees of the neighborhood. Gather nuts for planting on Autumn Arbor Day.

Make special study of the oaks, identifying the available species by leaf and acorn—as well as other characteristics recognized by the class. Make collection of oak leaves and acorns—bur ("mossy cup"), scarlet, white, red. Plant acorns on Autumn Arbor Day.

Plan a nutting party.

(N) The Oaks; Keeler—Our Native Trees

Autumn Arbor Day

See suggestions for this event last year. Plant nuts—acorns, walnut, butternut, chestnut, hickory.

Some oak nuts—acorns—sprout in the fall; which species? Sprouted acorns may be transplanted. Find suitable partial shade, with good soil.

Discuss value of nut trees. Find poems for the occasion. Share nuts with the squirrels. What do nuts cost at the store?

Hodge—Nature Study and Life; (N) The Oaks

The Bur Plants

On excursion discover burs clinging to clothes. Where did they come from? What is their name? Sticktights or pitchforks, beggar-ticks, Spanish needles, burdock, cocklebur (or buffalo bur), etc. What makes them stick so tightly? Discover hooks; how do they point?

Size of plant; exposed position of burs; number of burs; ease with which they separate from the parent plant. If burdock or beggar-tick flower heads are still available they may be identified as of the composite family—referring back to the study of the sunflower. What is this bur? A single seed or a head? (The sticktight is one fruit; the burdock bur is a head of fruits). Open the burdock bur to discover what is inside; what do you find? How many?

Of what use to the seed are the hooks on its coat (in the case of the sticktight) or around the head (in the case of the burdock)? Did you ever see the burs clinging to anything other than people's clothing? What else might come in contact with them? Sheep, dogs, cattle, horses. How far might the seeds travel in this way? Is this better for the bur plants than to have the seeds fall to the ground beneath the parent plant?

How did we find the milkweed seeds traveling? What other seeds travel in a similar way—by ballooning?

Beal—Seed Dispersal

Fall Bulbs; Hyacinths Planted in Pots or Window Boxes

Recall last fall's planting of Chinese lily and paper white narcissus; how did we plant them? How are they able to grow so well with nothing but water given to them? What have you eaten at the table which looks like one of these bulbs? (Onion.) Let us examine the onion—and then a hyacinth bulb—and learn what it is and why it can grow so rapidly. Full directions and lesson plan are given in the following:

(N) Planting and Care of Fall Bulbs

Weather Chart For November and December

See directions for fall term of last year. Thanksgiving month and Christmas month are of especial interest; keep charts during these months. In addition to "kind of day", record direction of wind by means of a red arrow flying with the wind. Lay the chart down with the top to the north; if the wind today blows against the east window, let the arrow fly across the circle for the day, as if it had entered the window. Hang the chart on the north wall and the arrow still points to the west, avoiding confusion. The west wind likewise is easily shown, and north and south will give no trouble. Soon it will be unnecessary to take the chart down when the arrow is placed. For an unusually strong wind a double barb may be used.

The Pumpkin

Obtain pumpkins in anticipation of Thanksgiving. The pumpkin plant and the flower have already been studied this fall. Plan a pumpkin pie and a jack-o'-lantern; let the lessons center about these, but bring out the conception of the pumpkin as a fruit, a seed-case. Perhaps a pie may be made—at least in part—in school. Also make a jack-o'-lantern. Save seed to plant next spring.

What other garden or farm products are similar to the pumpkin? Can you distinguish a squash from a pumpkin? Have you seen more than one kind (shape) of squash?

The Cow

See outlines for study of cat and horse last year. Begin with the experience of the pupils. Visit a barnyard; pasture; stable. The cow a grazing animal; how it eats; how different from horse,—tongue, teeth, manner of obtaining grass; the cud; advantages of the cud-chewing habit,—obtaining large quantities of food from large territory in short time, then masticating at leisure; what other animals have same habit?

Milk as food for young of cow and for man; how often milked; quantity of milk given; necessity for cleanliness in milking; the milking machine; products.

Significance of horns; defense; the life of wild cattle; what other animals have horns?

The ox as a beast of burden; how driven; work done.

Schmeil—Introduction to Zoology

The Christmas Tree

Review suggestions for first grade, fall term. Emphasis on identification of different evergreens.

How shall we trim the Christmas tree? Let us pop some of the popcorn which we have raised, and string it upon the tree. Different methods of popping; flavoring with butter, salt, sugar; popcorn balls.

There is opportunity here to deal very simply with the expansive force which causes the corn to pop. Evaporation of water from pan on stove, radiator, register or window sill; boiling in kettle: dancing of drop of water on hot stove or other metal; bursting of sausage skin during cooking, etc.

WINTER TERM

Clothing

Treat briefly the salient points brought out in last year's discussion.

(N) Hygiene for Primary Grades.

Food; Eating and Drinking

See suggestions for first grade, winter term The work may be a little more intensive than last year, as, for example, distinction between different modes of cooking may be made more specific. Avoid preaching.

(N) Hygiene for Primary Grades; Gulick Hygiene Series—Good Health.

Breathing; Ventilation

See suggestions for first grade. Be alert for indications of adenoids. Let the children take an active and intelligent part in caring for the ventilation of the room. Discuss conditions under which colds are taken.

(N) Hygiene for Primary grades; Gulick Hygiene Series—Good Health.

The Goldfish

Care of goldfish in aquarium; pure water; plant life; danger of overfeeding and polluting water.

Habits of the fish: means of locomotion; manner of eating; nostrils as organs of smell; breathing of aquatic creatures by means of gills: absence of eyelids.

If desired, supplement this study by use of a fish from the market.

(N) A Study of the Fish.

Special Senses

Reinforce the work done in first grade by making a more detailed study of the sense organs from the standpoint of function and hygiene. Emphasize the training of the senses, illustrating from different occupations or professions, as the eye of the Indian, the ear of the musician, the touch of the blind, etc.

(N) Hygiene for Primary Grades; Gulick Hygiene Series—Good Health.

Emergencies

As occasion offers, teach first aid to the injured. Ears and fingers which are frost-bitten, fingers that have been cut or burned, etc.,—these will afford opportunity for very practical lessons. Treatment of scratches, bruises, nosebleed, foreign substances in eye, choking, fainting, broken bones, stings of insects, poisons.

Gulick Hygiene Series—Emergencies: (N) Hygiene for Primary Grades.

The Dog

Note outlines for study of cat, horse and cow in previous terms.

What pets have you at home? What is your favorite pet animal? How many of you have a pet dog? What is its name? What kind of dog is it? (Poodle, fox terrier, etc.) What other kinds of dog do you know?

Habits, use, value, care, mental traits, age, etc. Never mind number of toes, but contrast non-retractile claws of dog with retractile claws of cat.

The dog in literature and art; obtain cheap prints of masterpieces and bring out the story they tell.

(N) The Dog; Hodge—Nature Study and Life; McMurry—Nature Study for Primary Grades.

Weather and Astronomical Studies

Weather chart for February; the month of Lincoln's birthday, St. Valentine's day and Washington's birthday; the shortest month. If desired, note conditions twice daily and develop number facts, fractional parts, etc.

Path of the sun through the day; changing length of day; sunrise and sunset points (if feasible); work of the sun.

Path of the moon; phases; time of moonrise or moonset; source of the moon's light.

Milky way; north star; dipper.

The Hen

How many of you are planning to raise some little chickens at your home this year? How do you go about it? How many eggs do you put under one mother hen? How long must she sit upon them before they hatch? How must she be cared for? What are the dangers that must be guarded against? Why is it that she must sit on the eggs so constantly? How warm is her body? Is it warmer than your hand? Her feathers act like clothing—recall function of clothing—in retaining the body heat.

Is it possible to hatch the eggs without the help of the hen? What do we call the apparatus that is used for this purpose? What is our chief concern about the incubator? (That proper constant temperature is maintained).

Have you an incubator at home? What is done with the chickens when they are hatched? What do they eat? How does the mother care for them?

During this time, if possible, have a hen in school and study it at first hand. It's adaptations for food securing, flight, warmth, etc., will suggest further treatment.

McMurry—Special Method in Science; Farmer's Bulletin No 41.

Signs of Spring

Follow suggestions for this topic in first grade. Do something with astronomical observations; length of day, etc., in this connection. Note lawns and gardens especially.

The bulb plants (hyacinths) planted last fall should be brought to light and warmth when well rooted, and should be under observation and in bloom during the late winter or early spring.

Plant pansy seed in window box.

OPTIONAL STUDIES

Winter Birds

Identification and habits of available winter birds. Provide food to attract desirable species; bones, suet, crumbs, etc. If the birds are not readily observed and abundant do not crowd this topic upon the class.

The English Sparrow

This bird may be kept under observation all winter. Habits, food, shelter, disposition, objectionable habits and traits, identification of male and female by color markings. To hold definitely to this common bird has many advantages over loose observations on birds which cannot be closely observed.

SPRING TERM

Bird Calendar

Keep blackboard calendar of returning birds, recording only such as are well known to the class from first hand observation. Insist upon accuracy in all reports. Devote special attention to a few species, and follow them through the spring.

Perhaps a screech owl has nested in the neighborhood; make a visit to its hollow-tree home to find the bird sitting in the doorway. Can you see the bird? Why is it so difficult to find? Advantage in such coloring and attitude. Schoolroom study of mounted specimen or colored picture (after field study).

When is the owl most active? How can it see at night? (Very large eyes). The owl flies very quietly; notice how soft its feathers are; it has keen hearing and depends largely upon stealth rather than bold pursuit like the hawk. How does the owl catch and hold its prey? Claws; bill. What does it eat? Its food—mice, insects, etc.,—is largely nocturnal in habit. Usefulness of the owl.

Study other birds similarly.

Trees

Identification of trees by general form and by bark. Observation of developing buds of shade trees. Learn the catalpa and the locust if these grow near by.

Special study of the oaks—continued from last fall. The oaks open their buds late. Identify scarlet, red, bur and white oaks or any other species available and follow the leafing and flowering in each kind. In the bare tree note framework and bark; distinguish one oak from another where possible; note dead leaves still clinging on scarlet oak. Bright ("autumn") colors of the leaves as they appear; distinguish different leaves by shape. Time to plant corn when oak leaves are as large as mouse ears; when is this? Distinguish staminate catkins—which furnish the pollen—and the very small pistillate flowers in axils of leaves; relative number of pistillate and staminate flowers. (A catkin is a large number of flowers on one stem). Why are so many staminate flowers necessary? How is the pollen carried? (By wind). Compare oak flowers with tassel and silk of corn (studied last fall). How long before the pistillate flowers will be acorns? Watch the acorns as they develop during the season. In the scarlet oak and the red oak find the yearling acorns which were flowers last spring and will be mature acorns next fall.

(N) The Oaks.

Spring Flowers

See suggestions and references for first grade, spring term. Special study of spring beauty, mandrake and wild rose.

Spring beauty—a native of moist, open woods; colonial habit which makes them much more attractive than if growing singly. Flowers in a loose cluster which rises from between two long, slender, succulent leaves. Let child learn to characterize the plant. Petals pink, with darker veins; petals five, sepals two; stamens five; pistil one. Function of flower parts, in review. Flowers blossom in succession along the stem, those at the tip opening last. Compare the inflorescence of the lily-of-the-valley. Underground parts—an enlarged portion of the stem, a tuber, which furnishes food for the early rapid growth of the plant, thus allowing early flowering before the leaves appear on the trees. Advantage to the plant in thus avoiding the forest shade. The fruit (seed pod). Plant seed or transplant entire plant to wild flower garden at school or home.

Study other flowers for this term in similar way. Get at the life of the plant, the life history,—not the mere form.

The Dandelion

Biographical study of a dandelion plant, distinguishing very young seedlings from plants which have lived over winter. Select some particular individual plant and follow its development, appearance of buds, time required for development, duration of blossom, flowering period, number of flowers, effect of weather conditions on blossom, maturing of seeds (fruits), identification of the dandelion blossom as a composite "head," elongation of stem to lift seeds to the wind.

This life history may be made very interesting and valuable. The work may be carried on in the dooryard. After learning the life story, discuss means of exterminating the dandelion from the lawn.

Scott—Nature Study and the Child; Bailey—Lessons With Plants.

Tree Seeds

Collect and plant seeds of catalpa—whose pods have been clinging to the tree all winter. Find locust pods; take out the seeds and pour boiling water over them before planting, Later, look for seeds of elm, maple, willow and cottonwood. Let the interest reach into the vacation period.

Inspect condition of trees planted from seed last spring and in the fall of both first and second grade.

Hodge—Nature Study and Life.

Arbor and Bird Day

Read directions for first grade. Plant tree seeds as suggested in the preceding topic. Last spring we planted either a fruit (apple) tree or a Christmas (Evergreen) tree; this year plant the one which was not chosen last year.

Aid the song birds with food, water and building material. Select some one favorite species (robin) and make a special study of its needs.

See references for last year.

The "Gopher," or Ground Squirrel

This familiar animal may be readily observed by almost every school pupil in northern Illinois. Note its first appearance after hibernation. How did it pass the winter? What other animals "sleep" throughout the winter? How does it dig its burrow? What other animals burrow? (Crawfish, earthworm, mole, woodchuck, etc). Habits, food, enemies; relation to agriculture.

If a suitable cage is at hand, or can be made, it may be permissible to "drown out" a ground squirrel and keep it for a few days in captivity to learn more of its habits, quantity of food consumed, etc. A young animal may be readily tamed.

Brehm—Life of Animals; Hornaday—American Natural History.

The Garden

Plant gourds, pumpkin (seeds saved from last fall); morning glory; balsam ("ladyslipper"); transplant pansies and asters.

OPTIONAL

Pond Animals

Excursion to study the life of the pond. If frog spawn was not obtained for first grade study last spring, make a special topic of it now. Also look for crawfish with young; insect larvae, such as dragonfly and Mayfly nymphs, water tiger, caddis worm, mosquito wrigglers. Take material to school and provide proper accomodation for it. Make informal study throughout the term, learning life histories.

Furneaux—Life in Ponds and Streams: Comstock—Manual for the Study of Insects; Hodge—Nature Study and Life.

If the frog was studied last spring, endeavor to obtain toad spawn

THIRD GRADE

If the purposes of the study have been achieved, the pupils enter their third school year with a greatly enriched body of nature lore, familiarity with a wide range of physical phenomena, a speaking acquaintance with many wild and domesticated forms, an elementary knowledge of life histories, a more sane and sympathetic appreciation of living things. They have gained a sense of power, of self-reliance in attacking problems and hunting clews. The world in which they are at home is beautiful and meaningful, and they are now readier to learn that it is an orderly world, a world of cause and effect. They are readier to investigate processes, to experiment, to determine conditions, to do things. Hence we advance in considerable part beyond static observation and give encouragement to the desire for more dynamic studies.

FALL TERM

The Garden

The gourds, pumpkin, morning glory, balsam and asters planted last spring will be of interest now, and will demand attention. Various uses for gourds; make dippers, birds nests, etc.

Climbing Plants

We have learned something of the vine habit from our interest in the gourds, pumpkin and morning glory. What other climbing plants do you know? Woodbine, Boston ivy, wild cucumber, wild grape, bittersweet, clematis, wistaria. Probably it would be best to study the morning glory in detail first before taking up other climbing plants.

The twining stem; the tendrils; clinging disks; do all climbers twine in the same direction around their support? Examine pole beans.

Identification of leaves; the flower, fruit and seed. Collect seeds to plant on Autumn Arbor Day.

The poison ivy; identification by three-fingered leaf; danger from the poisonous oil in the plant; how to treat the skin when poisoned.

Gray—Lessons in Botany; Farmer's Bulletin—Thirty Poisonous Plants.

Certain Forms of Seed Dispersal

Avoiding the deadening repetition of the forms already studied (milkweed, thistle, dandelion, and the burs) the third grade will consider the dispersal scheme of the balsam (ladyslipper), jewel weed (touch-me-not) and violet, in which the pod forcibly expels the seed; the curly or yellow dock, which floats on water or blows over the snow crust: and the tumbleweed, in which the entire plant above ground cuts loose and travels with the wind, scattering its seeds as it goes.

Bring a pod of ladyslipper from the garden; lay it on the table and allow it to burst when fully mature; how far does it shoot its seeds? Place a pod on the ground and touch it; how far do the seeds roll? Obtain (by class excursion, preferably) pods of jewelweed and treat similarly; likewise pods of the common violet. Advantages of expelled seeds over those which drop directly below parent plant. How are the seeds expelled? Examine pods which have exploded.

How may the seeds (fruits) of the curly dock be dispersed? We often find the dock in abundance on low ground near water; what would happen if the dock fruit fell into water? Experiment shows that it will float. Is there any particular portion which is lighter than the rest? Examine closely; describe what you find. Three small leaves, upright, forming triangular box; at the base of each leaf a small ball of "cork;"

will the cork alone float? Repeat these tests, first submerging the fruit until it is well wetted. Where is the seed? Look inside the fruit; what do you find? A small hard triangular nut. Will it float? By what other means than water might these light dry fruits of the dock be distributed far from the parent plant? Recall how a hard smooth crust often forms over the snow. Does the dock still bear its fruits in winter? Bear this question in mind when snow comes.

On excursion find various species of tumbleweed blowing about the fields or lodged against the fences. What is the meaning of this in the life of the plant? What provision does it require? (Cutting off the stem at the ground). Hunt for tumbleweeds which have not "cut loose" and learn the character of the stem just above the ground.

Beal—Seed Dispersal.

Tree Seeds

Gather seeds of shade trees which mature their seeds in the fall,—box elder, ash, hard maple, linden, pine and other conifers, ironwood, birch. Save some for planting on Autumn Arbor Day. Make collection of tree seeds in vials, making sure that they are thoroughly dry so that they will not mold; label kind of seed and date when gathered; add to collection throughout the year and leave as property of the room.

Hodge—Nature Study and Life.

Autumn Arbor Day

Plant seeds of vines studied this fall—woodbine, bittersweet, wild cucumber, etc. Plant tree seeds collected this fall.

Fall Bulbs

Plant bulbs of daffodils—either Golden Spur (single) or Von Sion (double). Recall other bulbs planted in previous grades.

(N) Planting and Care of Fall Bulbs.

Pebbles

Life history of lake, river or glacial pebble, choosing according to locality. Excursion to collect attractive pebbles; sort them at school; discover flat ones ("sailors"), others with fossil remains, others showing crystals, others with hard protruding nodules, others with glacial striations, etc. Let each kind tell its own story.

Charles—How To Read A Pebble; Shaler—First Book of Geology.

Barnyard Fowls

Familiar breeds of chickens; duck; geese; guinea fowl; peacock; pheasants; turkey; pigeons.

Last year (winter term, second grade) we learned how chickens are raised. There are many kinds of chickens; do you know the names of any? (White leghorn, buff rock, bantam and others). What kind are yours? Distinguish three or four familiar breeds of the neighborhood. Excursion to identify them. Peculiar features of each. Care of chickens; the house, fence, yard; nests; number of eggs laid; price of eggs. The life of the (wild) prairie hen.

Let those who have other fowls at home describe their traits, their food, habits, value. Distinguish the water fowl from the scratchers. Adaptations of each.

Watson—Farm Poultry; Farmer's Bulletins, numbers 41, 51, 177 and others; McMurry—Special Method in Science.

The Rosette Habit in Plants

Field study of thistle, dandelion, mullein, plantain and other fall plants whose foliage takes the form of the rosette. Advantages of this habit in relation to light, moisture, cold. Develop through questions.

Coulter—Plant Studies

Harvest Time

Autumn activities of farm, orchard and garden. Exhibit of products, in connection with Thanksgiving.

Storing of garden vegetables and fruits; preparation for table; ways of cooking; purpose of cooking; food values. The starch test. This may be treated as a topic in physiology and hygiene.

OPTIONAL STUDIES

Insect Preparation For Winter

See suggestions for fall term, first grade.

Leaf Mold

See suggestions for study of trees in fall term, first grade. Value of dead leaves in forming soil; make compost.

Aquarium

Stock aquarium with various forms of pond life before the water freezes. Mussel, snail, fishes, algae, etc.

WINTER TERM

Winter Birds

After listing the birds which are recognized as staying here during the winter, discover three groups on the basis of food habit: Woodpeckers, sparrows (seed eaters) and birds of prey. Economic value of these groups as destroyers of insects, weed seeds and rodents.

Migration problem largely a question of food supply. Make the study informal.

(N) The Woodpeckers; (N) The Sparrows and Their Relatives; (N) The Birds of Prey; (N) Winter Birds.

The Thermometer

How can we tell how cold it is? Have you noticed the thermometer hanging out-of-doors? in this room? Have you one at home? What is it for? How does it work; what does it do? What is inside of the tube? The mercury goes up—out of the bulb—when the air is warmer, and down into the bulb—like a bear into his den—when it is colder.

How can we tell how high the mercury goes—that is, how warm it is? See the little marks—scale—at the side of the tube. What does this thermometer say now? (70°) Each little mark on the scale counts two degrees. Let us put the thermometer out-of-doors and see what the mercury will do.

(Have a model of a thermometer made of a long strip of cardboard on which the scale is marked; indicate the bulb by large colored circle From the center of the circle let a piece of baby ribbon (colored like the bulb) come through from behind and run up to indicate the mercury (or alcohol colored red). To the top of this attach a white ribbon which will not be noticed at a distance against the cardboard; run the white ribbon through the cardboard at the top of the scale and attach behind to the other end of the colored ribbon, thus making an endless band of ribbon which may be moved on the scale to represent rise or fall of mercury.)

Now tell me by this thermometer (card and ribbon) how warm it is. (70°) Who will make it read 60? 50? 30? 32? When the weather is getting colder what does the mercury do? Let us bring in the thermometer which we put out-of-doors; what did it read when we took it out? What does it read now? Let us put it into this hot water for a moment; what happens? (Be sure that the thermometer will stand this treatment.)

By some such means the children will readily learn to read a thermometer which has a very large scale. Teach freezing point and room temperature.

Recall expansion in popcorn and in water heated in kettle—fall term, second grade.

Keeping blackboard record of thermometer until February; then let each pupil make individual weekly weather book, ruling off space for days of weeks and recording thermometer reading, kind of day and direction of wind. When opportunity affords, associate north wind with cold and south wind with warm weather. Note prevailing (westerly) wind.

The Temperature Curve

After mastering the reading of the thermometer teach how to "make a picture of the temperature for the week",—a graph. Draw a thermometer scale and bulb on the board; have a child complete the sketch by adding the mercury column to a given height, as to 70°. Now have each child make similar sketch. Now draw a horizontal line and upon this as a base sketch five thermometers—one for each day of the week—having the scales alike; that is, equal readings will stand at equal heights. Add the mercury column to proper height for the day, as the readings are reported. Now draw a line to connect the tops of the five columns, or the temperature for the week. We thus have the temperature curve which indicates "the behavior of the thermometer" for the week. Now dispense with the thermometer sketch and use only the vertical line for each day and the horizontal lines to indicate the multiples of 10° on the scale. Indicate the reading for the day by dot, and connect these dots to make the "picture of the thermometer" for the week.

Let each child make individual weekly weather books, showing kind of day (clear, cloudy, rain or snow), direction of the wind, temperature, and temperature curve, until he has mastered the ideas involved. One month should suffice.

Problems in Hygiene

Appealing to experiment and individual experience, teach position and function of stomach, heart and lungs. Develop the conception of digestion, distribution and oxidation of food material (taking the functions in this order). Proper care of these organs; evils of intemperance in any form. This is the first work which deals intensively with internal organs; make it interesting; inculcate a desire, a zest, for a strong and healthy body.

Assuming that the hygiene lessons of the previous grades are well in hand, make a study of habits, thus allowing a review and new view of hygiene topics. What habits are; how they are acquired; the advantage of forming good habits; matters of cleanliness, posture, language, courtesy, as well as of eating, breathing, observing, etc.

(N) Hygiene for Primary Grades; Gulick Hygiene Series—Good Health; The Body At Work; Krohn—Graded Lessons in Hygiene.

Uses Of Fire About The House

Heating; different methods—open fire-place, stove, hot air, steam, hot water. Kinds of fuel. Dangers. Chimneys. Fire-proof construction. Insurance.

Cooking; method; kinds of fuel. Electricity for cooking.

Lighting; candle, oil lamp, gas, electricity.

Laundry.

Matches; other methods of starting fire; the sun as source of heat.

The Rabbit

Read suggestions on domesticated animals already studied. The rabbit is readily available for the schoolroom and affords interesting study.

Experience with pets; why the rabbit is so common a pet; care, food, habits, shelter, number of young.

The wild rabbit; its mode of life, protective coloration, food (teeth), enemies, harm done to orchards, etc. Kinds of wild rabbits; cottontail, jack rabbit.

The albino; the Belgian hare.

McMurry—Nature Study for Primary Grades; Burroughs—Squirrels and Other Fur Bearers; Schmeil—Introduction to Zoology.

Window Garden

Bring to the window—as soon as roots are well formed—the daffodils planted last fall.

Plant sweet peas in window box in March.

(N) Window Gardens.

SPRING TERM

Tree Calendar

Keep record of awakening of winter buds of familiar trees; in this grade the pupils should have a speaking acquaintance with many species of trees. Bring in specimens of twigs from each tree as the buds open. Excursion to make observations; note rapid advance of foliage after warm rains.

Keeler—Our Native Trees; Hutchinson—Trees In Winter; Rogers—The Tree Book

Birds

Further study of familiar birds, extending the list of species known and making more intensive study (in the field) of habits, peculiarities, nesting, etc. Discover characteristic traits for each bird; allow the children the joy of learning at first hand; put a premium on original observations while in the field.

Seeds and Seedlings

Comparative study of pea, bean, pumpkin and corn seeds and seedlings. Effect of soaking in water: seed leaves and coat; seed leaves and food storage; storage of food outside of the seed leaf in the corn. Germination; factors affecting the sprouting and continued growth; planting on cotton, blotting paper, sponge, sawdust.

The pea, gorged to the maximum with food, does not lift its cotyledons above the ground, but has a well developed plumule (bud) which soon reaches the light. The pumpkin has very thin seed leaves, with little food stored, which are to appear above ground and enlarge into foliage leaves; associated with this fact is the minuteness of the plumule. The bean is intermediate in form and likewise in behavior, sometimes appearing above ground and sometimes not; the various types of beans differ in this regard. Thus we have an interesting series with which to make comparative studies.

The corn has but one seed leaf, which acts as an absorbent for the food material. Distinguish root and shoot. Obtain seed corn and test its vitality.

Grow seeds in light and darkness; in warmth and at lower temperature; in water, in moist air and in dry air.

Demonstrate importance of cotyledon in early stages of germination by growing two pea seedlings side by side, one with and one without its seed leaves. Take two duplicate seedlings which have a root about an inch long; let the root pierce cotton or blotting paper and enter water or very moist air; do not let the portion above the root become dry. Arrange all details so that conditions are the same in both cases; then cut the seed leaves from one of the peas, taking care not to injure the plumule. The seedling which has been deprived of its store of food will fall behind in the race.

It is of greatest importance that this and all other experiments shall grow out of the class discussion and that they shall be suggested by the class as a means of solving problems.

Bailey—Lessons With Plants; Gray—Lessons in Botany; Bergen—Foundations of Botany

The Lawn

The importance of the lawn in contributing to the enjoyment of the home. Grading, rolling, seeding, watering, fertilizing, mowing. Weeds, insects and other trespassers. Trees, shrubs, borders, hardy perennials for different purposes.

Visit well-planned and well kept lawns and analyze their attractiveness; discover what care is given them. Excursion to identify lawn weeds, etc. What are the present needs of the school grounds? Make this emphatically an outdoor topic. Learn what kinds of seed are preferable.

Farmers' Bulletin No. — , The Lawn; Bailey—Garden Making Country Life in America, March, 1906.

Arbor and Bird Day

If the work assigned for the previous years has been done, there are many seedling fruit, nut and shade trees planted from seed by the children. These should now be transplanted.

Shall we leave our little trees in the nursery bed until they grow large enough to be placed where we want them permanently, or shall we move them now and let them grow in a different place for a while? What kind of roots will they soon have if we leave them here? What difficulty may we have in transplanting them? The roots will be long and deep, so that we shall have to cut and injure them. How will it affect the seedlings to move them now? It will cause them to throw out more branching rootlets and by checking the growth of the taproot it will make subsequent transplantings much easier. When a transplanted tree grows well we know that it is in good health. Thus a transplanted tree is worth more than one which has never been moved. More than one transplanting is desirable.

Cautions in moving trees; injury to roots; drying, etc.

If there are no planted seedlings, or, but few, take trip to find very small tree seedlings which may be had for the digging.

Inter-relations of birds and trees. Trees afford shade, security, food, nesting site; birds often plant trees. Woodpeckers and bluejays carry nuts; very many birds carry berries and seeds of certain vines; how about cherries? apples? mulberries? hackberries?

Arbor and Bird Day Bulletins published by State Superintendent of Illinois and by the State Superintendents of other states, notable Wisconsin and New York. These may be had for the asking.

The Garden

Plant a bed of flax to illustrate the making of linen; a bed of carrots for the rabbit and cow as well as for ourselves. California poppy and single red poppy.

Insect Galls On Trees

In June our elm trees are often infested by the plant louse which is responsible for the "cockscomb elm leaf gall". These galls are frequently very abundant, often several on a leaf, greatly marring the appearance of the tree.

What are these strange "warts" on the elm leaves? What has caused them? Examine a leaf which has one of these growths upon it; is the growth part of the leaf? It is called a gall. How did the leaf form the gall? Look at the under side of the leaf; what do you find underneath the gall? (A slender opening; the gall is pushed up like a pocket; it is a pocket gall). What has caused the leaf to do this? Let us break open one of the youngest galls; what do you find? Now open an older gall. These tiny creatures are aphids, or plant lice. There are many kinds of aphids; this particular kind so affects the elm leaf that the gall is formed, making an excellent shelter and home for the family which is to live and multiply here. Did you ever see insects which you now think were aphids? Look on the rose stems and on your house plants.

Have you seen peculiar growths (galls) on any other tree than the elm? Similarly study the corrugated cottonwood gall, which is easily distinguished at the end of the twig in any infested tree; the pine cone willow gall, which is a swollen terminal bud containing—when new—the creature which is responsible for it; the oak apple, etc.

Comstock—Manual For the Study of Insects.

The Clovers

Identify all the clovers of the neighborhood, after making a special study of the white or the red clover. Hop clover, white sweet clover, yellow sweet clover, alsike. Economic importance; use as hay; enriching the soil. Study of the flower head: provision for insect visitation; the work of the bumblebee.

Bailey—Lesson With Plants; Darwin—Origin of Species

SECOND GROUP—GRADES IV, V and VI.

These years are marked by a conscious demand for directed activities, a keener criticism of school requirements, as whether the demands be just, whether the lessons be worth while, according to certain standards. Hence the studies, to satisfy (if for no other reason), must be cumulative, mutually reenforcing, leading to a definite, organizing body of knowledge. The pupil likes to learn to do things, to control events, to understand machines, to handle tools, to train animals, to know something of how the world's work is carried on, to project future needs and the means of satisfying them, to own things, to make collections and to trade, to form combines, and to study things en masse.

FOURTH GRADE

This is a transition stage in which the children still work well as a group and with a group motive, but individuality is rapidly strengthening and consciously demands recognition. For example, a suggestion that the class raise vegetables for financial profit to the school will meet with hearty response, yet there will probably be several pupils who will desire an individual garden in addition to their participation in the group enterprise.

The work may be much more of an intensive nature than heretofore and fewer topics will be treated. The fourth grade child is highly investigative; his search is more detailed. Hygiene must be richly supplemented by anatomy and physiology; there is an appeal for apparatus and experiment; the historical sense is developing; the interaction of organisms is of increasing interest; economic considerations apply much more than formerly.

FALL TERM

Care of the garden

The Locust and its Relatives

The common locust, or short-horned grasshopper (not the cicada), is abundant now. Discover different stages in its development; its manner of life; harm done to crops; its adaptations.

Other creatures of similar body plan—meadow grasshopper, katydid, cricket, walking stick, cockroach.

How these creatures get their living, how they make their calls; their enemies; how to combat the injurious forms.

(N) The Locust and Its Relatives; Colton—Zoology.

The Corn Plant and its Relatives

Biological and economic study of the corn plant and other grains or grasses. Very full treatment in the first reference below.

McMurry—Special Methods In Science; Sargent—Corn Plants; Government and State Bulletins.

Tulip Bed

Obtain bulb catalogues, order choice varieties of tulips and prepare a tulip bed or border on the school grounds. Selection of bulbs, preparation of soil, manner of planting, and care after planting will furnish a series of real problems that are worth while.

(N) Planting and Care of Fall Bulbs.

Animals of the Pond

Turtle, mussel, snail, crawfish, muskrat, fish and others. Capture and take to school for study, providing suitable tank or aquarium. Method here should be easy.

Zoology texts and Natural Histories.

Animals of the Zoo

A study of native wild animals in captivity. Wolf, fox, raccoon, squirrel, opossum, bear, deer, bison, beaver and others.

Habits, food, domestication, disposition, distribution, habitat, related forms; economic importance.

Response to training and kind treatment; pet animals.

Game preserves; trade in wild animals for menageries.

Schmeil—Introduction to Zoology; Illinois Arbor and Bird Day Bulletin for 1908—Article on Animal Pets; Hornaday—American Natural History; Bostock—Training of Wild Animals; selections from John Burroughs and Ernest Thompson-Seton.

The Turkey—In connection with Thanksgiving

The wild turkey and the domesticated turkey. Origin of the latter. Habits and traits of each. How to raise a turkey. The Thanksgiving market.

Shaler—Domesticated Animals; Century Dictionary.

The Teeth

The study of human teeth was anticipated in the study of the animals of the zoo, where gnawing (incisor), tearing (canine) and grinding (molar) types are prominent.

Kinds of teeth; temporary and permanent teeth; structure—obtaining specimens from dentist and grinding some to show longitudinal section; care of teeth. The work of the dentist.

Thomson—Zoology; Gray—Anatomy.

WINTER TERM

Heavenly Bodies

Sun, moon, planets, stars, constellations; north star, dipper, Orion, the Pleiades, Cassiopeia, the milky way. Teach the nature of the sun and other heavenly bodies; identify as many as conditions permit; review the phases of the moon.

Use of stars by navigators. Star of Bethlehem.

Ball—Starland; Cerviss—Astronomy With an Opera Glass.

Levers

The crowbar as a tool; different ways of using it; the advantages gained; illustrate in class. Discover that a "teeter—totter" is a crowbar, or lever. Find other examples of the lever device,—wheelbarrow, shears, hinged door, etc. Avoid formal classification, but learn three ways of using the lever.

Find levers in machines.

Murches' Science Readers, Book IV.; Physics Texts.

Bones—The Framework of the Body

Concluding the previous topic, discover levers in the arm and leg; bones as levers worked by muscles which are fastened to them; "origin" and "insertion" of muscles. Bones as a supporting framework and as a protection to delicate parts. The cranium as a box formed by bones which fuse; the trunk—vertebrae, ribs and sternum—a body axis and a box for the chest; the limbs—attached to shoulder girdle and pelvis.

Structure of bone; change with age; examination (with hand microscope) of portion of bone ground thin on grind stone to show minute cavities occupied by cells during life; the nature of the cell; how the bone cell is nourished.

Hygiene of the skeleton; accidents to bones.

The Muscles

Forms of exercise; what muscles are called into play; names of easily identified muscles; the gymnasium; uses of different kinds of apparatus.

Hygiene of exercise; circulation; demand upon heart; effect of training; digestion: respiration; excretion; effect of modern city life.

Athletic games; the dictates of a professional coach; physical education among the Greeks, Germans and other peoples.

Bodily measurements and tests; developing weak organs; evil effects of tobacco, alcohol and other forms of abuse.

The Skin

Functions, structure (very simply) and care of this important organ. Bathing. Disturbances from exercise, extreme of temperature, or drugs; explanation of the drunkard's red face and why he may freeze to death more readily than a normal man.

McMurry—Special Method in Science.

Sanitary Problems

The cellar; the sink; drainage; sewerage; the vegetable room; garbage disposal; disinfectants; vents for gases, etc.

Forms of Water

Liquid, solid and gaseous forms; the history of a raindrop; the rainbow (simply); soft water.

Illustrated work on evaporation, solutions, filtering, etc.

Drinking water; contamination; ice water; the refrigerator.

Scott—Nature Study and the Child.

SPRING TERM

The Elm Tree

Intensive study of the twig at time of bud opening. Flower bud and twig bud—significance of relative size, position, time of development.

How to tell the age of a twig,—color, branching, terminal bud scars, annual rings.

Bud arrangement and its effect upon the character of the branch and the tree.

Identification of different kinds of elm—at least the red (slippery) and the white (American). Uses of the wood.

Historic elms.

Keep a calendar of a typical elm tree, recording the important events in its career this spring.

Newell—Reader in Botany.

The Woodpeckers

Biographical studies of our five common woodpeckers; the common characters of the group; economic value.

Base this study upon field observations; make several class excursions when conditions are favorable. Supplement with pictures or museum material.

(N) The Woodpeckers; Eckstorm—The Woodpeckers; Bulletin No. 7, Div. of Ornithology, "The Food of Woodpeckers."

Care of the Tulip Bed

Life History of the Mosquito

Obtain material from any stagnant water; let each pupil have a "wriggler" in a glass tumbler, vial or bottle; study its activities and follow its metamorphoses.

The story of malaria and yellow fever. How to get rid of the mosquito nuisance. Let each pupil kill a confined larva by dropping oil on the water.

Government Bulletins; Hodge—Nature Study and Life; Gulick Hygiene Series—Town and City.

Ornamental Shrubs

Identification of flowering shrubs. How to plan the home grounds. How to select shrubbery; how to plant. Sequence of flowering; calendar of flowering of the shrubs of the neighborhood. Study of nursery catalogues; prices of different shrubs. How shrubs are grown for the market.

Arbor and Bird Day

Plant shrubs from the woods; or obtain some cultivated shrub selected on its merits for a special purpose.

Make bird boxes for bluebird, and wren.

Injurious Insects of the Garden

Identify and note damage done by potato beetle, cucumber beetle, cabbage worm, squash bug, aphis and others.

Native enemies—insectivorous animals; an appreciation of the toad, the bat and the birds.

Hodge—Nature Study and Life.

The Garden

Plant cotton seed early in April indoors in flower pot; later set pot in ground, after danger from frost is past. Plant sweet potatoes under glass (that is, in a cold frame); remove glass after cold weather is past.

Set out dahlias.

Allow those who desire individual gardens to have 50 square feet; make condition that all planting is to be planned in advance in consultation, and that beds are to be maintained in first class condition.

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